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FOREST PEST MANAGEMENT

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BIOLOGICAL EVALUATION

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Mountain Pine Beetle Mortality in Ponderosa Pine - BLM Exemption Area Black Hills of South Dakota

1988

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ABSTRACT

Thirty-seven mountain pine beetle (Dendroctonus ponderosae Hopk.) - killed ponderosa pine (Pinus ponderosa Laws) were found along 5 miles of cruise survey lines in the Exemption Area of the Black Hills, South Dakota. Thirty-nine percent (39%) of the attacked trees were newly infested in 1987; 21% in 1986; 20% in 1985; and 24% were unsuccessfully attacked. An average of 0.33 trees/acre were infested by the beetle in 1987 - an increase of 1.6x over the number killed in 1986. Overall, from 1985 to 1987 the trend in tree mortality has remained static to increasing.

INTRODUCTION

For the past 100 years, the mountain pine beetle (MPB),(Dendroctonus ponderosae Hopk.) has been recorded as the major cause of mortality to ponderosa pine, (Pinus ponderosa Laws) in the Black Hills, South Dakota. During this time, roughly nine major MPB outbreaks have occurred (Lessard 1986). These outbreaks resulted in extensive and somewhat uniform distribution of large pockets of beetle-killed trees.

During beetle infestations, all land ownerships are affected. Forested areas on public and private land, with similar elevations, are equally at risk to tree damage and losses. The objective of this evaluation was to determine the MPB attack trend in the Exemption Area in the North-Central Black Hills; and to compare our data with the prediction made in 1986.

METHODS

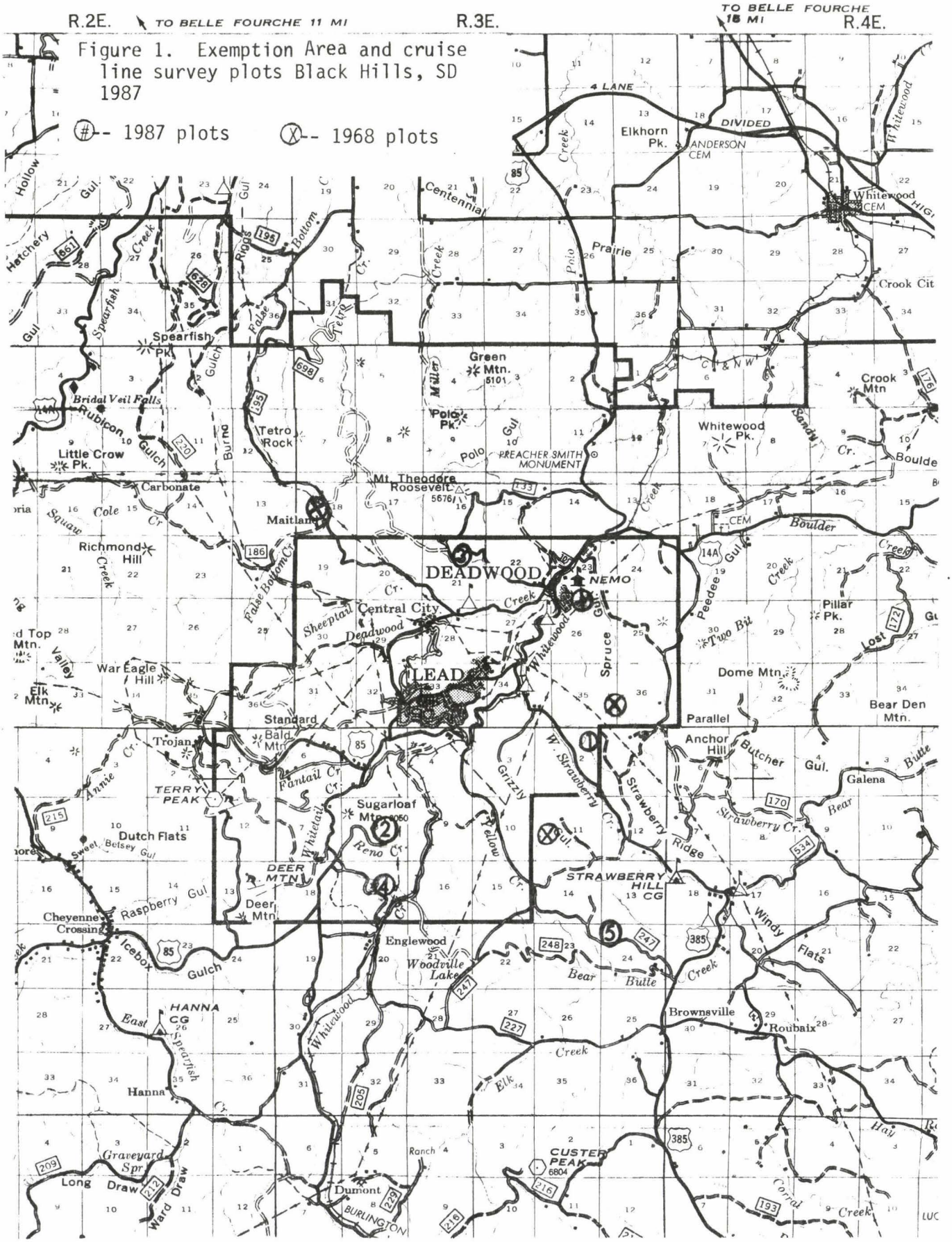
Cruise lines, 1 mi. by 1 chain, were established in five stands, four of which are in the Exemption Area and one in the adjacent National Forest. Along each cruise line, ponderosa pine attacked by mountain pine beetle within the past three years were tallied by year of attack and the diameter of each tree was measured to the nearest 0.1 inch. We added all attacked trees by year and determined the ratio of old to newly attacked trees for 1985, '86, and '87, respectively. In 1986 this same information was gathered from this general vicinity. Data from 1986 will be compared with the data from this evaluation in order to follow up on attack trend predictions made in 1986 from the data collected that year. See map (Figure 1) for cruise line locations and the Exemption Area boundary.

RESULTS AND DISCUSSION

Data summary tables of the number of attacked trees per plot, per acre, diameters, and attack ratios are provided in tables 1-4, respectively.

Overall mortality from beetle attacks remained static to increasing from 1986 to 1987. No more than 1.6 trees were successfully attacked in 1987 for every tree killed in 1986 based on our data.

Current (1987) infested trees were found in plots 3-5 and ranged from 0.5 to 1.0 infested tree per acre. No 1987 MPB trees were found in plots 1 and 2. However, evidence of past beetle activity was found in the form of several downed and standing pine laced with beetle brood galleries and associated blue staining fungus. Pockets of Armillaria root rot were also present.


R.2E.
TO BELLE FOURCHE 11 MI
R.3E.
TO BELLE FOURCHE 15 MI
R.4E.
Figure 1. Exemption Area and cruise line survey plots Black Hills, SD 1987
#-- 1987 plots
X-- 1968 plots
DEADWOOD
LEAD
NEMO
Central City
Deadwood
Sheeptail
Maitland
Carbonate
Mt. Theodore Roosevelt 5676
Green Mtn. 5101
Polo Pk.
Spearfish Pk.
Bridal Veil Falls
Rubicon
Little Crow Pk.
Tetro Rock
Richmond Hill
War Eagle Hill
Elk Mtn.
Standard
Bald Mtn.
Trojan
TERRY PEAK
Sugarloaf Mtn. 5050
Dutch Flats
Deer Mtn.
DEER MTN
Cheyenne Crossing
Icebox
Englewood
Woodville Lake
HANNA CG
Hanna
Graveyard Spr.
Dumont
BURLINGTON
CUSTER PEAK 6804
Ranch
Elkhorn Pk.
ANDERSON CEM
Whitewood CEM
Prairie
Crook Mtn
Whitewood Pk.
PREACHER SMITH MONUMENT
Boulder
Pillar Pk.
Two Bit
Dome Mtn.
Bear Den Mtn.
Parallel
Anchor Hill
Galena
STRAWBERRY HILL CG
Strawberry Ridge
Brownsville
Roubaix
Windy Flats
Spruce
Grizzly
Yellow
Whitewood
Spearfish
Annie
Fantail
Reno
Raspberry
Sweet Betsey
Icebox Gulch
Long Draw
Ward Draw
Hollow
Hatchery
Burns
False Bottom
Squaw
Cole
Valley
Peedee
Lost
Butcher
Bear Butte
Elk
Hail
Corral
Crook Cit
Centennial
4 LANE
DIVIDED

The past mortality caused by a combination of root rot and MPB in plots 1 and 2, has reduced the number of trees and reduced overall stand susceptibility to further beetle outbreaks.

Our 1986 data and associated attack trend predictions indicated a decline in MPB attacks and subsequent tree mortality would be evident in 1987. Based on what we found, a steep decline in mortality did occur and it may be attributable to one or both of the following reasons:

1. Data sets were not collected from the same plots. However, stocking levels and stand composition, in some cases, were similar for both data sets collected in 1986 and 1987.

2. Average diameter of 1986 infested trees was 7.5 in. (Lessard, 1986) in plots surveyed in 1986. Beetle reproduction and survival is significantly lower in trees of this small diameter, hence fewer beetles would emerge to contribute to 1987 mortality.

Table 1 TREES PER ACRE INFESTED IN THE EXEMPTION AREA, BLACK HILLS, SD, 1987

PLOT	INFESTED TREES PER ACRE			
	1985	1986	1987	Pitchouts
1	0	0.25	0	0
2	0	0.38	0	0.13
3	0.13	0.25	0.50	0.38
4	0.50	0.13	0.13	0.25
5	0.25	0	1.0	0.38
Mean	0.18	0.20	0.33	0.23
Attack Ratio		1.1:1	1.6:1	

Table 2 AVERAGE DIAMETER OF MPB ATTACKED PONDEROSA PINE IN EXEMPTION AREA, BLACK HILLS, SD, 1987

1985	1986	1987	Pitchouts
13.7	11.6	11.9	11.8

LITERATURE CITED

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Lessard, Gene. 1982. Factors Affecting Ponderosa Pine Stand Susceptibility to Mountain Pine Beetle in Black Hills 1981, USDA Forest Service, Rocky Mountain Region, Timber, Forest Pest, and Cooperative Forestry Management, Bio. Eval. R2-84-8, 20 pp.